Prepared for:

Investigative Report of the Electrical Installation at the Surfside Community Center

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Surfside, Florida 33154

Prepared by:

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EXCEPTIONAL SOLUTIONS

July 2006

INTRODUCTION

On Friday, July 21, 2006, I met with Mr. W. D. Higginbotham in the office of the Town Manager, Town of Surfside, FL. Mr. Higginbotham briefed me on the events calling for my presence to evaluate the situation and make recommendations.

RECORD OF EVENTS AND OBSERVATIONS

Mr. Higginbotham accompanied me across the street to the Surfside Community Center, 9301 Collins Avenue, where I met Mr. Tim Miliam, Parks & Recreation Director. Mr. Miliam accompanied me to the Community Center Pool where we were joined by Mr. Tom Nielsen, an electrician with All Purpose Electrical. Mr. Nielsen briefed me on the location of the electrical panel and testing that he had performed following the incidents that had occurred at the pool. The power to the pool room panel had been shut off, the pool was closed and the closed area marked with yellow marker tape.

Mr. Nielsen had performed some testing while the pool was in operation. With the sump pump in operation voltages ranging from 0 to 35 volts AC were detected between a probe placed in the pool adjacent to light fixtures and a nearby junction box; between ladders, fill spout, diving board supports, and nearby junction boxes. The measurements at the ladders indicated no voltage was present. When the sump pump was turned off, no voltages were present at any of the same points of measurement. A written report of the results of the electrician's tests was to be prepared but I have not been provided a copy of that report.

Mr. Don Johnson, Electrical Inspector for the Town of Surfside joined the group and the incident was discussed, the testing that had been performed was described, and it was decided that until further notice the electrical power to the pump room would be turned off and the pool would remain closed.

Further investigation was postponed until Monday due to the presence of water in the pump room. A new sump pump was to be purchased on Saturday and the room was to be pumped out on Monday morning to provide safe access for our inspection.

I arrived at the pool at 10:00 a.m. Monday morning and met Mr. Tim Miliam and Mr. Tom Nielsen. We examined the sump pump that had been removed. The unit was badly corroded and I was unable to determine the manufacturer. We were told by employees that the pump was about 8 years old. From the data on the plate the following information was recorded:

510155 Model No. 10-IA
115V 60 Hz Single Phase 11A
UL Listing – 23 H1 Sump Pump

The unit has an incorporated float switch that has a vent tube installed with the conductors in the flexible power cord. It was reported that the float switch had not been operational for some time, perhaps as long as two years, and the pump was controlled at the pump room panel by switching on and off the circuit breaker that serves the receptacle circuit serving the pump.

There were two notices on the pump as listed below:

"Thermally protected."

"To reduce risk of electric shock, connect only to a properly grounded, grounded type receptacle. This pump has not been investigated for use in swimming pool areas. Suitable motor control switch shall be provided at time of connection."

TESTING

The pump had been removed from the sump and the water with corrosion residue had partially been drained out of the unit. We attempted to take some readings and did obtain one reading with an ohmmeter that indicated a resistance of 2.9 ohms between the hot terminal of the plug and the ground. After this reading was obtained we observed several other readings between 112-164 ohms but these readings were dismissed as unreliable. We were not able to verify the 2.9 ohm reading again. These tests were discounted as unreliable data.

The pump was placed in a large bucket with water nearly up to the top of the pump and the pump energized in an attempt to measure a voltage on the case of the pump during operation. We were unsuccessful in obtaining a reading. No further testing of the pump was performed.

With the new sump pump running, voltage was measured at the pool light where the highest reading was recorded. No voltage was present.

The plans for the pool were dated 1962 indicating that if construction followed immediately, the original pool installation is approximately 43 years old. The power distribution system was examined to determine how the pump room was powered.

The pump room is supplied from the Main Distribution Panel from a 3P.,100A circuit breaker with three conductors, the conduit acting as the equipment grounding conductor, to an enclosed 3P.,60A circuit breaker. This circuit breaker feeds the pump room panel that is a load center having a 1P., 20A circuit breaker feeding two receptacles, one for the sump pump, the other not in use at the time of the observation. The receptacles are 120V, 20A duplex receptacles served with 2-12 AWG, 12 AWG Ground. They are not Ground Fault Circuit Interrupter type receptacles.

A portion of the pool lighting is supplied from Panel 3 Circuits P3-26,28, 1P.,20A each that supplies a lighting cabinet on the north side of the pool.

A panel has been installed at the open shelter on the south side of the pool. This panel is also fed from Panel 3. The electrical installation work at the shelter is not consistent with the National Electrical Contractors Association Standard of Installation. One of the pool floodlights located on the east side of the pool with a receptacle on the pole was being served by a 1P.,25A circuit breaker. The electrician turned the breaker off. Only a cursory inspection of this facility was performed.

On the south side of the building a disconnect switch served from Panel 3 powers pumps and controls for a water playground. The piping is PVC and it appears that the only electrical in the playground is the control device recessed in the top of a pipe. There is an insulated cover for the control device precluding any contact with any energized element.

CONCLUSIONS

The commentary in Article 680.1 of the National Electrical Code states: "Shock hazards in and around a swimming pool can result from faulty electrical equipment directly associated with the pool or from faulty electrical equipment not associated with but in close proximity to the pool."

1. All indications are that the source of voltage in the pool originated from a faulty sump pump.
2. The wide variation in the voltage readings obtained indicates that due to the age of the pool and equipment and/or conditions, the bonding system for the pool is suspect and some elements may not be bonded at all.

RECOMMENDATIONS

1. The pool should remain closed until it meets the requirements of the National Electrical Code, Article 680, Swimming Pools, Fountains, and Similar Installations.
2. Due to the age of the pool and modifications made during its years of operation a new bonding system should be installed. Equipotential bonding is required under Article 680.26 of the National Electrical Code to eliminate voltage gradients in the pool area. In order to do this a saw cut of sufficient width and depth should be made around the perimeter of the pool and a 6 AWG (Code requires an 8 AWG minimum) bare copper grounding conductor installed and connected to the system ground. A minimum 8 AWG copper connector should be connected from the 6 AWG grounding conductor to all metal parts, ladders, handrails, water-circulating equipment, sump pump, forming shells of pool light fixtures, life guard station supports, diving board supports, and the fill spout. Connections are required to be made by

exothermic welds or by listed pressure connectors, clamps, or other listed means, in accordance with Article 250.8. At several locations around the perimeter of the pool, for example at the pool lights forming shells, the reinforcing steel should be accessed and connected to the grounding conductor.

3. A sump pump with automatic float, listed for operation in and around swimming pools, should be obtained for use in the pump room.
4. Operations personnel should be instructed to discontinue operation of any electrical equipment when it ceases to operate as described in the manufacturer's operating instructions.
5. An equipment grounding conductor sized in accordance with NEC 250.122 is required to be installed from the Main Distribution Panel to the enclosed circuit breaker and from the enclosed circuit breaker to the pump room panel.
6. The electrical installation at the covered shelter should be investigated fully and all deficiencies corrected.
7. All lighting and receptacle outlets in the pool pump room should be provided with GFCI protection.

ALTERNATIVE USE OF THE POOL DECK

In the event it is not economically feasible to correct the pool deficiencies, the pool deck including the water playground could be used if the pool were filled with sand, the pump room electrical panel de-energized, and the covered shelter and floodlighting corrected to comply with NEC code requirements.

Before reopening the area the entire electrical system serving the area should be checked for compliance with the National Electrical Code.